The METEOR project will co-develop innovative Earth Observation (EO) protocols to deliver robust national-scale natural hazard exposure and vulnerability data with a focus on Nepal and Tanzania. Working with partners in these 'lighthouse' countries will improve the understanding of the distribution and character of building and infrastructure's exposure to natural hazards. The aim of this quantitative assessment is to support Disaster Risk Management (DRM) decisions, increase resilience and improve risk mitigation.

Initial footprints for: landslide, seismic, volcanic and flood hazards will be produced for the relevant countries, as requested in initial consultations.
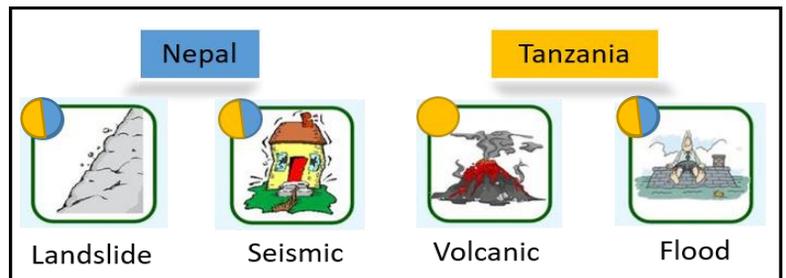
METEOR will be co-designed and co-delivered with local and national partners at all stages, helping to ensure delivery of sustainable impact through capacity-building and knowledge-sharing throughout the project.

Project outputs will include: national hazard footprints for Nepal and Tanzania, freely available updated exposure data for the 47 Least Developed Countries (LDCs), open-access protocols for producing and updating the data and define the associated uncertainty, taxonomy for multi-peril vulnerability, construction of a data portal with interactive tools, knowledge sharing, and educational/training material.
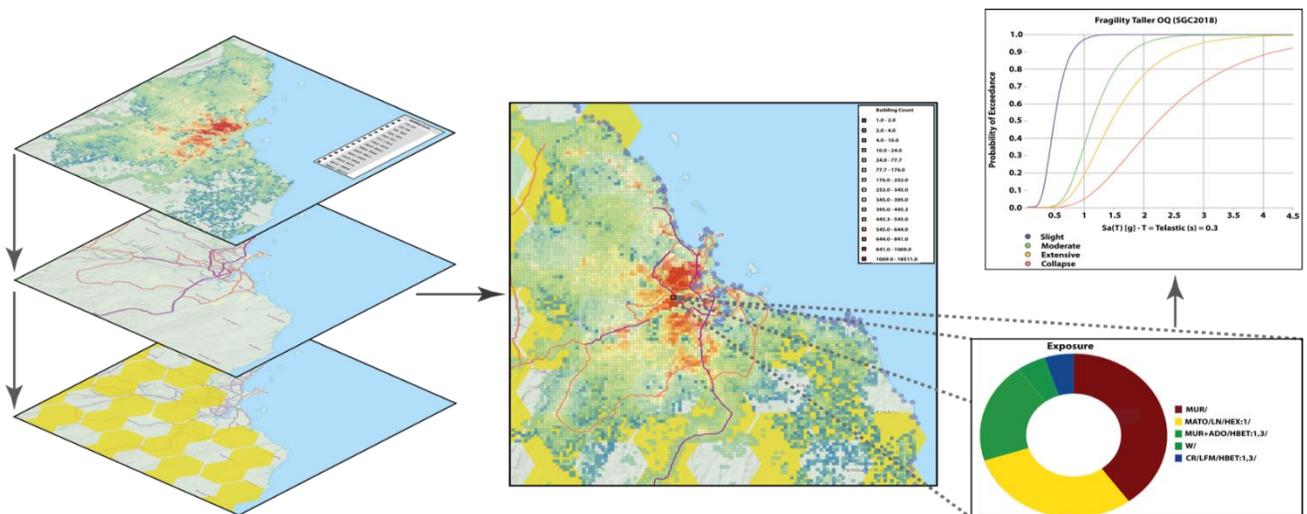
Schematic of data aggregation for hazard, exposure and vulnerability.

METEOR in Tanzania

Recent flood events have highlighted the vulnerability of Dar es Salaam and other parts of Tanzania to natural hazards. National hazard footprints for multi-hazards will be identified and classified using literature, inventories and descriptions of previous events including: location, type, dimension, run-out, velocity, frequency etc. Characterisation of the nature of hazard allows for further hazard assessment of areas that may be susceptible to future events. These footprints should capture the uncertainty of incorporating varied datasets. The co-developed protocols will have significant applications for prioritizing land use planning, land acquisition programmes and building codes as well as pre-positioning emergency response over the national territory.
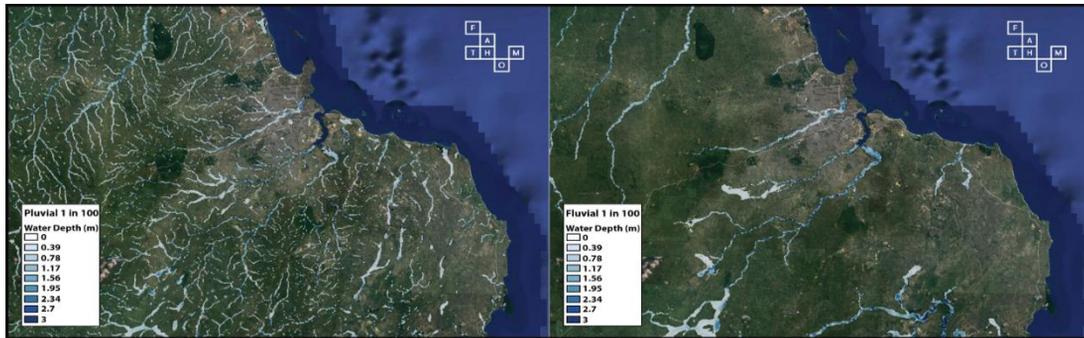
Pluvial and Fluvial flood hazard in Dar es Salaam for a 1 in 100 event. Resolution = 90m. Data Source: FATHOM

METEOR will assess multi-hazard footprints, population and building exposure and areas of subsequent vulnerabilities. For Tanzania, the main hazard focus will be flood and earthquake. Data will be collected on the number and type of buildings, as well as other key infrastructure. These will be used to quantify areas of high / low population exposure. By assessing the distribution of building typology (inset pie chart) for a specific pixel it is possible to identify the most common structure at each location. This information can be then correlated with the GEM Openquake platform which provides fragility and failure information for building stock, providing a vulnerability assessment that can be used for targeted DRM planning.
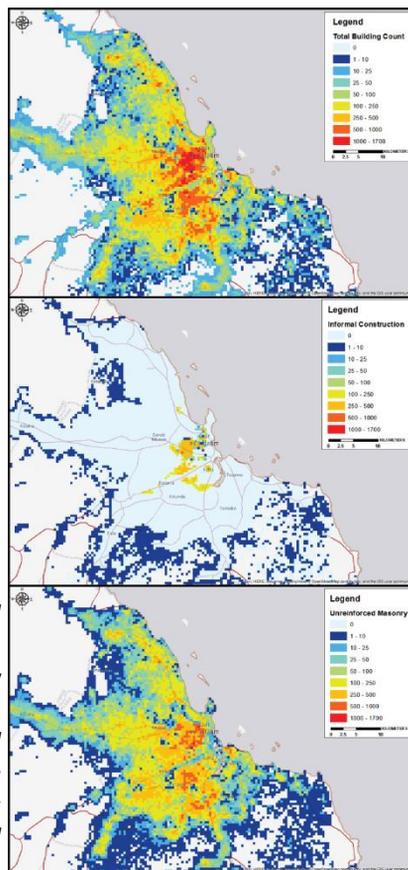
Example of building exposure data: Total Building Count, Informal Construction and Unreinforced Masonry, provided by ImageCat.
Building typology proportions and fragility / failure curves will be available for each pixel. In this example the curves represent failure for unreinforced masonry, provided by GEM.